

## CLAIMS

What is claimed is:

1 1. A method comprising:  
2 receiving a plurality of data units along a plurality of virtual connections  
3 in a network, each virtual connection of said plurality of virtual connections  
4 having a predetermined unit rate;  
5 storing said plurality of data units; and  
6 transmitting a data unit of said plurality of data units having a data unit  
7 rate higher than said predetermined unit rate of said each virtual connection at  
8 predetermined time intervals.

1 2. The method according to claim 1, wherein said network is an  
2 Asynchronous Transfer Mode Network.

1 3. The method according to claim 1, wherein said storing further  
2 comprises:  
3 storing said predetermined unit rate of said each virtual connection in a table.

1 4. The method according to claim 3, wherein said storing further  
2 comprises storing said predetermined unit rate of said each virtual connection  
3 in descending order in said table.



1           5.       The method according to claim 3, wherein said transmitting  
2 further comprises:  
3 comparing said predetermined unit rate of said each virtual connection; and  
4 selecting said data unit rate.

1           6.       The method according to claim 1, wherein said receiving further  
2 comprises receiving said plurality of data units in a line card including at least  
3 one service group interface having a plurality of classes of service.

1           7.       The method according to claim 6, wherein said receiving further  
2 comprises receiving said plurality of data units in a plurality of class of service  
3 buffers within said at least one service group interface, each class of service  
4 buffer corresponding to one class of service of said plurality of classes of  
5 service.

1           8.       The method according to claim 1, wherein said plurality of data  
2 units further comprises cells.

1           9.       The method according to claim 7, wherein said transmitting  
2 further comprises:

3 selecting a service group interface from said at least one service group  
4 interface corresponding to one virtual connection of said plurality of virtual  
5 connections having said data unit rate; and  
6 selecting one class of service buffer within said service group interface,  
7 said class of service buffer storing said data unit.

1 10. The method according to claim 9, wherein selecting said service  
2 group interface further comprises determining each service group interface of  
3 said at least one service group interface having a departure time parameter  
4 value lower than or equal to a current time value.

1 11. The method according to claim 9, wherein selecting said one class  
2 of service buffer further comprises determining each class of service buffer  
3 within said service group interface having a departure time buffer parameter  
4 value lower than or equal to a current time value.

1 12. A method comprising:  
2 detecting an empty buffer of a plurality of buffers storing data received  
3 along a plurality of virtual connections in a network;  
4 comparing a time counter corresponding to each buffer of said plurality  
5 of buffers to determine a service buffer ready to be processed; and

6 updating an empty time counter corresponding to said empty buffer  
7 based on said time counter of said service buffer.

1 13. The method according to claim 12, wherein said updating further  
2 comprises updating said empty time counter corresponding to said empty  
3 buffer to said time counter of said service buffer, if said empty time counter is  
4 lower than said time counter of said service buffer.

1 14. The method according to claim 12, wherein said network is an  
2 Asynchronous Transfer Mode Network.

1 15. The method according to claim 12, wherein said detecting further  
2 comprises:  
3 monitoring said data in said each buffer of said plurality of buffers; and  
4 detecting said empty buffer when said data is retrieved from said empty  
5 buffer.

1 16. The method according to claim 12, wherein said comparing  
2 further comprises selecting said service buffer having a lowest value of said  
3 time counter of said each buffer.

1           17.    The method according to claim 12, further comprising  
2    maintaining said empty time counter, if said empty time counter is higher than  
3    said time counter of said service buffer.

1           18.    The method according to claim 12, wherein said data stored in  
2    said plurality of buffers further comprises cells.

1           19.    A computer readable medium containing executable instructions  
2    which, when executed in a processing system, cause the system to perform a  
3    method comprising:  
4            receiving a plurality of data units along a plurality of virtual connections  
5    in a network, each virtual connection of said plurality of virtual connections  
6    having a predetermined unit rate;  
7            storing said plurality of data units; and  
8            transmitting a data unit of said plurality of data units having a data unit  
9    rate higher than said predetermined unit rate of said each virtual connection at  
10   predetermined time intervals.

1           20.    The computer readable medium according to claim 19, wherein  
2    said network is an Asynchronous Transfer Mode Network.

1           21.    The computer readable medium according to claim 19, wherein  
2   said storing further comprises storing said predetermined unit rate of said each  
3   virtual connection in a table.

1           22.    The computer readable medium according to claim 21, wherein  
2   said storing further comprises storing said predetermined unit rate of said each  
3   virtual connection in descending order in said table.

1           23.    The computer readable medium according to claim 21, wherein  
2   said transmitting further comprises:  
3           comparing said predetermined unit rate of said each virtual connection  
4   and selecting said data unit rate.

1           24.    The computer readable medium according to claim 19, wherein  
2   said receiving further comprises receiving said plurality of data units in a line  
3   card including at least one service group interface having a plurality of classes  
4   of service.

1           25.    The computer readable medium according to claim 24, wherein  
2   said receiving further comprises receiving said plurality of data units in a  
3   plurality of class of service buffers within said at least one service group

4 interface, each class of service buffer corresponding to one class of service of  
5 said plurality of classes of service.

1 26. The computer readable medium according to claim 19, wherein  
2 said plurality of data units further comprises cells.

1 27. The computer readable medium according to claim 25, wherein  
2 said transmitting further comprises:

3 selecting a service group interface from said at least one service group  
4 interface corresponding to one virtual connection of said plurality of virtual  
5 connections having said data unit rate; and

6 selecting one class of service buffer within said service group interface,  
7 said class of service buffer storing said data unit.

1 28. The computer readable medium according to claim 27, wherein  
2 selecting said service group interface further comprises determining each  
3 service group interface of said at least one service group interface having a  
4 departure time parameter value lower than or equal to a current time value.

1 29. The computer readable medium according to claim 27, wherein  
2 selecting said one class of service buffer further comprises determining each

3 class of service buffer within said service group interface having a departure  
4 time buffer parameter value lower than or equal to a current time value.

1 30. A computer readable medium containing executable instructions  
2 which, when executed in a processing system, cause the system to perform a  
3 method comprising:

4 detecting an empty buffer of a plurality of buffers storing data received  
5 along a plurality of virtual connections in a network;

6 comparing a time counter corresponding to each buffer of said plurality  
7 of buffers to determine a service buffer ready to be processed; and

8 updating an empty time counter corresponding to said empty buffer  
9 based on said time counter of said service buffer.

1 31. The computer readable medium according to claim 30, wherein  
2 said updating further comprises updating said empty time counter  
3 corresponding to said empty buffer to said time counter of said service buffer, if  
4 said empty time counter is lower than said time counter of said service buffer.

1 32. The computer readable medium according to claim 30, wherein  
2 said network is an Asynchronous Transfer Mode Network.



1           33.    The computer readable medium according to claim 30, wherein  
2   said detecting further comprises:  
3       monitoring said data in said each buffer of said plurality of buffers; and  
4       detecting said empty buffer when said data is retrieved from said empty  
5   buffer.

1           34.    The computer readable medium according to claim 30, wherein  
2   said comparing further comprises selecting said service buffer having a lowest  
3   value of said time counter of said each buffer.

1           35.    The computer readable medium according to claim 30, wherein  
2   the method further comprises maintaining said empty time counter, if said  
3   empty time counter is higher than said time counter of said service buffer.

1           36.    The computer readable medium according to claim 30, wherein  
2   said data stored in said plurality of buffers further comprises cells.

1           37.    A system comprising:  
2       means for receiving a plurality of data units along a plurality of virtual  
3   connections in a network, each virtual connection of said plurality of virtual  
4   connections having a predetermined unit rate;  
5       means for storing said plurality of data units; and

6 means for transmitting a data unit of said plurality of data units having a  
7 data unit rate higher than said predetermined unit rate of said each virtual  
8 connection at predetermined time intervals.

1 38. The system according to claim 37, wherein said network is an  
2 Asynchronous Transfer Mode Network.

1 39. The system according to claim 37, further comprising:  
2 means for storing said predetermined unit rate of said each virtual  
3 connection in a table.

1 40. The system according to claim 39, further comprising means for  
2 storing said predetermined unit rate of said each virtual connection in  
3 descending order in said table.

1 41. The system according to claim 39, further comprising:  
2 means for comparing said predetermined unit rate of said each virtual  
3 connection; and  
4 means for selecting said data unit rate.

1           42.     The system according to claim 37, further comprising means for  
2     receiving said plurality of data units in a line card including at least one service  
3     group interface having a plurality of classes of service.

1           43.     The system according to claim 42, further comprising means for  
2     receiving said plurality of data units in a plurality of class of service buffers  
3     within said at least one service group interface, each class of service buffer  
4     corresponding to one class of service of said plurality of classes of service.

1           44.     The system according to claim 37, wherein said plurality of data  
2     units further comprises cells.

1           45.     The system according to claim 43, further comprising:  
2                 means for selecting a service group interface from said at least one  
3     service group interface corresponding to one virtual connection of said  
4     plurality of virtual connections having said data unit rate; and  
5                 means for selecting one class of service buffer within said service group  
6     interface, said class of service buffer storing said data unit.

1           46.     The system according to claim 45, further comprising means for  
2     determining each service group interface of said at least one service group

3 interface having a departure time parameter value lower than or equal to a  
4 current time value.

1 47. The system according to claim 45, further comprising means for  
2 determining each class of service buffer within said service group interface  
3 having a departure time buffer parameter value lower than or equal to a  
4 current time value.

1 48. A system comprising:  
2 means for detecting an empty buffer of a plurality of buffers storing data  
3 received along a plurality of virtual connections in a network;  
4 means for comparing a time counter corresponding to each buffer of said  
5 plurality of buffers to determine a service buffer ready to be processed; and  
6 means for updating an empty time counter corresponding to said empty  
7 buffer based on said time counter of said service buffer.

1 49. The system according to claim 48, further comprising means for  
2 updating said empty time counter corresponding to said empty buffer to said  
3 time counter of said service buffer, if said empty time counter is lower than said  
4 time counter of said service buffer.

1           50.    The system according to claim 48, wherein said network is an  
2 Asynchronous Transfer Mode Network.

1           51.    The system according to claim 48, further comprising:  
2           means for monitoring said data in said each buffer of said plurality of  
3           buffers; and  
4           means for detecting said empty buffer when said data is retrieved from  
5 said empty buffer.

1           52.    The system according to claim 48, further comprising means for  
2 selecting said service buffer having a lowest value of said time counter of said  
3 each buffer.

1           53.    The system according to claim 48, further comprising means for  
2 maintaining said empty time counter, if said empty time counter is higher than  
3 said time counter of said service buffer.

1           54.    The system according to claim 48, wherein said data stored in said  
2 plurality of buffers further comprises cells.

1           55.    A system comprising:

2 a memory module for receiving a plurality of data units along a plurality  
3 of virtual connections in a network, each virtual connection of said plurality of  
4 virtual connections having a predetermined unit rate;  
5 for storing said plurality of data units; and  
6 a scheduler module coupled to said memory module for transmitting a  
7 data unit of said plurality of data units having a data unit rate higher than said  
8 predetermined unit rate of said each virtual connection at predetermined time  
9 intervals.

1 56. The system according to claim 55, wherein said network is an  
2 Asynchronous Transfer Mode Network.

1 57. The system according to claim 55, wherein said scheduler module  
2 further stores said predetermined unit rate of said each virtual connection in a  
3 table.

1 58. The system according to claim 57, wherein said scheduler module  
2 further stores said predetermined unit rate of said each virtual connection in  
3 descending order in said table.

1           59.    The system according to claim 57, wherein said scheduler module  
2   further compares said predetermined unit rate of said each virtual connection  
3   and selects said data unit rate.

1           60.    The system according to claim 55, wherein said memory module  
2   further includes at least one service group interface having a plurality of classes  
3   of service.

1           61.    The system according to claim 60, wherein said memory module  
2   further receives said plurality of data units in a plurality of class of service  
3   buffers within said at least one service group interface, each class of service  
4   buffer corresponding to one class of service of said plurality of classes of  
5   service.

1           62.    The system according to claim 55, wherein said plurality of data  
2   units further comprises cells.

1           63.    The system according to claim 61, wherein said scheduler module  
2   further selects a service group interface from said at least one service group  
3   interface corresponding to one virtual connection of said plurality of virtual  
4   connections having said data unit rate and selects one class of service buffer

5 within said service group interface, said class of service buffer storing said data  
6 unit.

1 64. The system according to claim 63, wherein said scheduler module  
2 further determines each service group interface of said at least one service  
3 group interface having a departure time parameter value lower than or equal to  
4 a current time value.

1 65. The system according to claim 63, wherein said scheduler module  
2 further determines each class of service buffer within said service group  
3 interface having a departure time buffer parameter value lower than or equal to  
4 a current time value.

1 66. A system comprising:  
2 a scheduler module for detecting an empty buffer of a plurality of  
3 buffers storing data received along a plurality of virtual connections in a  
4 network, for comparing a time counter corresponding to each buffer of said  
5 plurality of buffers to determine a service buffer ready to be processed and for  
6 updating an empty time counter corresponding to said empty buffer based on  
7 said time counter of said service buffer.



